

IN THE CLAIMS

1-16 (Cancelled).

17. (Currently Amended) An apparatus for humidifying a hydrocarbon stream comprising:

a vessel which defines an interior cavity and having an inlet adjacent a lower end of the cavity for receiving a hydrocarbon stream;

a bed of a packing material in the cavity; and

water filling at least a portion of the bed; and

a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.

18. (Original) The apparatus of claim 17, further including:

a second inlet in the vessel for adding water to the vessel.

19. (Original) The apparatus of claim 17, further including a return line for returning a portion of a hydrocarbon stream which has been humidified to the cavity.

20. (Original) The apparatus of claim 17 further including:

a mixer for mixing the humidified hydrocarbon stream with an unhumidified hydrocarbon stream to form a combined stream; and

a sensor for detecting a moisture content of at least one of the unhumidified hydrocarbon stream and the combined stream.

21. (Previously Presented) The apparatus of claim 17, wherein the vessel includes an outlet through which the humidified hydrocarbon stream exits the vessel.

22. (Previously Presented) The apparatus of claim 17, wherein the packing material is in the form of particles.

23. (Previously Presented) The apparatus of claim 22, wherein the particles have a smaller average diameter adjacent a bottom of the bed than adjacent a top of the bed.

24. (Previously Presented) The apparatus of claim 23, wherein the particles in the bottom layer have an average diameter of approximately 0.2 to 0.5 centimeters and the particles in the top layer have an average diameter of approximately 1 to 1.5 centimeters.

25. (Previously Presented) The apparatus of claim 17, wherein the packing material comprises porcelain.

26. (Previously Presented) The apparatus of claim 17, further including a source of the hydrocarbon stream fluidly connected with the inlet.

27. (Previously Presented) The apparatus of claim 17, wherein the source includes at least one hydrocarbon from mono-unsaturated alkanes and conjugated dienes.

28. (Previously Presented) The apparatus of claim 17, wherein the source of the hydrocarbon stream further includes a solvent in which the hydrocarbon is soluble.

29. (Previously Presented) The apparatus of claim 17, further including a head space in the vessel above the bed and the water for allowing liquid water to fall out of the humidified hydrocarbon stream so that the humidified hydrocarbon stream is substantially free of undissolved water.

30. (Previously Presented) The apparatus of claim 17, wherein the particles are spherical.

31. (Currently Amended) A humidification apparatus comprising:

    a vessel which defines an interior cavity and having an inlet adjacent a lower end of the cavity and an outlet adjacent an upper end of the cavity;

    a bed of a packing material in the cavity, the packing material comprising particles which are larger in size toward an upper end of the bed;

    water filling a portion of the bed; and

    a head space which spaces the outlet from the water and the packing material; and

a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon

32. (Previously Presented). The apparatus of claim 31, further including a liquid level gauge for adjusting a height of the water.

33. (Currently Amended) An apparatus for humidifying and polymerizing a hydrocarbon stream comprising:

a vessel which defines an interior cavity, the vessel comprising a first inlet adjacent a lower end of the cavity for receiving a hydrocarbon stream, a second inlet for adding water to the vessel, and an outlet;

a bed in the cavity, the bed comprising a packing material and water which fills a portion of the bed; and

a head space in the cavity above the bed which allows liquid water to fall out of the hydrocarbon stream; and

a polymerization reactor coupled to the outlet.

34. (New) The apparatus of claim 17, further comprising a second vessel coupled to the inlet, wherein the second vessel includes a mono-unsaturated alkene or conjugated diene.

35. (New) The apparatus of claim 17, further comprising a polymerization reactor coupled to the outlet.

36. (New) The apparatus of claim 31, wherein the vessel further comprises a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.

37. (New) The apparatus of claim 31, further comprising a polymerization reactor coupled to the outlet.

38. (New) The apparatus of claim 33, wherein the vessel further comprises a disengagement zone, comprising a hydrocarbon monomer having a water content and undissolved water entrained with the hydrocarbon.

39. (New) The apparatus of claim 33, further comprising a second vessel coupled to the inlet, wherein the second vessel includes a mono-unsaturated alkene or conjugated diene.

40. (New) The apparatus of claim 31, wherein the mono-unsaturated alkene or conjugated diene is a liquid.

41. (New) The apparatus of claim 21, further comprising a three-way valve coupled to the outlet, a sampling chamber, and a polymerization reactor.

42. (New) The apparatus of claim 41, further comprising a heater coupled between the three-way valve and the sampling chamber.